REMARKS

In the above-identified office action the Examiner has objected to claims 17 and 18 citing insufficient antecedent basis for a limitation. Applicant has cancelled that portion of the claim and accordingly this matter is considered obviated.

Claims 17-18 have been rejected as being anticipated by Iida et al. The Examiner has stated that the value of $1.06x(G1_{center}$ and $G2_{center})^{-0.2}$ can be determined to be 0.68. Applicant does not understand how the Examiner has determined this; however, the recitation of that formula in claims 17 and 18 was erroneous. It has now been corrected and as such, Iida does not provide support for this value. Applicant notes that the Examiner has stated that the G_c of Iida reads on Applicant's $G1_{center}$ and $G2_{center}$. Iida does not disclose a parameter, which conforms to both of Applicant's $G1_{center}$ and $G2_{center}$. As defined in the specification, G1 signifies the temperature gradient in the axis direction in the temperature region in which the pattern of defects introduced during growths is determined is approximately 1350°C. G2 signifies the axial direction in which temperature gradient of the void defect formation temperature region is approximately 1120°C. $G1_{center}$, therefore, denotes the axial direction temperature gradient at the crystal center from the solid liquid interface temperature to approximately 1350°C, while $G2_{center}$ denotes the axial direction temperature gradient at the center of the crystal near 1120°C. While the G_c of Iida may be argued to be equivalent to Applicant's $G1_{center}$, there is no equivalent in parameter in Iida for $G2_{center}$. Accordingly, Iida cannot suggest or make obvious the subject invention.

It was well known at the time of filing of the present application that growth defects in a single crystal can be controlled by changing the pulling speed. However, it cannot be said that all the single crystals produced in this manner are suitable for semiconductor devices. Prior to now, the procedures for producing a single crystal suitable for a semiconductor device material have been more art than science.

The present invention has clarified the conditions for producing crystals suitable for the semiconductor device material, and has made correlations among unique parameters such as "G1edge/G1center" and "G1center X G2center", and the pass rate of a gate oxide film withstand

voltage characteristic (GOI C mode yield) and presence/absence of dislocation clusters. More concretely, as the conditions for producing an ingot without dislocation clusters and whose GOI C mode yield is 60% or more, the invention shows the following ranges:

(1) $1.15 \leq Gl_{edge}/G1_{center} \leq 1.25$; and

(2) $0.5 <$ (**OSF** ring inner diameter/crystal diameter) $< 1.06 \text{ X } (G1_{center} \text{ x } G2_{center})^{-0.2}$

These ranges were obtained by the unique experiments carried out by the inventor of the present invention. The results thereof are shown in Figs. 3(A) to 3(F). These results cannot be obtained by simply optimizing the pulling speed, as concluded by the article cited below (page 978).

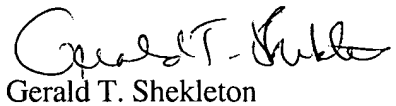
Applicant has amended the claims to recite a 60% or better GOI C mode yield which relates to the reliability failure rate of semiconductor devices. The attached figure (reference Fig. A) shows the relationship between the GOI C mode yield and the reliability failure rate of semiconductor devices as described in "Proceedings of the Seventh International Symposium on Silicon Materials Science and Technology"(enclosed) (Figs. 3-4). As shown in the referenced Fig. A, when the GOI C mode yield is 40% or less, the reliability failure rate becomes abruptly high. Thus, Fig. A tells us that if the GOI C mode yield is low, it is not suitable for semiconductor devices. The inventor of the present invention has defined 60% of the GOI C mode yield as a boundary between good articles and defective articles. In this manner crystals suitable for a semiconductor device material can be obtained.

Iida (US 5,968,264) does not teach or suggest "G1edge/G1center" or "G1center x G2center", nor the GOI C mode yield. Iida does not refer to the conditions and effects of the present invention at all. Further, as stated above, Iida does not describe the numerical value of G2center. Therefore, it is impossible to calculate the "(G1 center X G2center)$^{-0.2}$", and it is impossible to derive the present invention from Iida.

Applicant hereby requests reconsideration and re-examination thereof.

With the above amendments and the remarks, this application is considered ready for allowance, and Applicants earnestly solicit an early notice of same. If the Examiner believes that a telephone conference would expedite prosecution of the subject application, he is respectfully requested to call the undersigned attorney at the telephone number listed below.

Respectfully submitted,



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